

# On a New Species of *Moroteuthis* from the Bay of Sagami, *M. Lönnbergii*.

BY

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With Plates XLV and XLVI.

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The mantle is, roughly speaking, an elongated retort; somewhat narrow and cylindrical at the entrance, bulging out gradually from about one-fourth to one-third from the orifice, the broadest part lying at about the anterior one-third. From this point it first gradually narrows till about the anterior edge of the attachment of the fins, whence posteriorly it tapers rather suddenly, the posterior one-fourth forming nearly a straight tube. It is also cylindrical near its orifice, becoming flattened posteriorly.

The anterior edge of the mantle shows a conical projection on the mid-dorsal line, flanking on both sides with a slight concavity to the lateral angular projections. The ventral edge of the mantle is rather deeply concave, the perpendicular of the deepest median portion of the concavity being nearly one-fourth the distance between the angular projections.

The actual lengths and the circumferences of the mantle of five specimens measured are as follows:—

No. of Specimens.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Length of the mantle .....	192mm.	147mm.	183mm.	185mm.	275mm.
Circumference at its orifice....	125mm.	105mm.	115mm.	115mm.	165mm.
Circumference at the anterior extremity of the attach- ment of the fin.....	87mm.	72mm.	90mm.	87mm.	130mm.

The surface of the mantle and the head as well as the aboral surface of the basal portion of the arms show the warty appearance characteristic

of the genus. On the mantle this appearance is caused by longitudinal elevations of the dermis, which are about 0.3–0.8 mm in diameter, and anastomosing one another by branches placed obliquely, leaving elongated depressions. These depressions are, for the most part, nearly of the same diameter as the elevations between them, but sometimes broader. The structure of the dermis on the head differs in this that the elevations are in form of semi-spheres of about 0.5–0.6mm in diameter placed close together, giving an appearance like that of shagreen.

It is to be remarked, however, that these elevations and depressions differ considerably according to the state of preservation of the animals. Thus in one specimen the elevations on the mantle are more or less in the shape of polygons, giving the appearance of a reticulated structure, while in others, the elevations seem to be contracted into numerous semi-spherical nodules, which give to the surface an appearance like that we find on the head.

The fins are of an elongated rhomboidal shape, the anterior end of each forming a free rounded lobe and inserted a little on the side of the median line: the inner posterior angle of the lobe is turned slightly medianwards. The distance between the lobes equals about two-fifths of the mantle diameter at the corresponding place. The length of the fin is a little longer than half the length of the mantle. The greatest breadth across the lateral angles is a little less than its length taken from the base of the anterior lobe to its extremity. The lateral angles are broadly rounded, and lie in a line at about one-fifth of the length of the fin. The antero-lateral margin is slightly convex, the postero-lateral also convex, but with a slight concavity along the middle portion, becoming convex again posteriorly, and ends on the dorso-lateral side of the mantle a little in front of its extremity.

The actual measurements of the fins in the five specimens are as follows:—

No. of Specimens.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5
Mantle length.....	192mm.	147mm.	183mm.	185mm.	275mm.
Length of the fin.....	105mm.	81mm.	100mm.	97mm.	149mm.
Length of the fin in % of the } mantle length.....	54%	55%	54%	52%	54%

No. of Specimens.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Length of the line of attachment of the fin.....	95mm.	73mm.	92mm.	88mm.	141mm.
Breadth of the fin across the lateral angles.....	98mm.	83mm.	100mm.	97mm.	132mm.
Breadth of the fin in % of the mantle length.....	49%	55%	54%	52%	48%
Distance from the posterior end of the fin to the line across the lateral angles.....	68mm.	56mm.	63mm.	70mm.	106mm.

The siphonal groove is large and tolerably deep, with a distinct ridge along its side, which posteriorly becomes confluent with the ventral longitudinal fold of the neck. Anteriorly the edge of the groove becomes continuous with the general ventral surface of the head, each anterior end of the groove being represented by a rounded depression separated by a flattened ridge, the surface of which being continuous with the general ventral surface of the head. This ridge soon bifurcates with a rounded angle, and runs posteriorly on each side parallel with the lateral margins of the groove as a narrow ridge to the base of the groove. The siphon is rather broad, narrow anteriorly, with a large transverse orifice; the siphonal organ is large and conspicuous, the median unpaired piece is of an arrow-head shape, the posterior end of the arms extending out of the postero-ventral margin of the siphon; the lateral pieces are long-ovate, its anterior portion slightly broader than its posterior, and its diameter a little less than its length.

The siphonal cartilage is somewhat broader posteriorly, the inner margin nearly straight, while the outer margin bulges out slightly near the anterior third, then showing a slight and gradual curvature, again bulging out at the posterior end. The diameter near the posterior end equals a little less than one-third of the length, and about three-fourths of the diameter near the anterior end. The groove is broad and shallow, and of a similar shape to that of the cartilage itself; its inner edge deepens rather abruptly, becoming gradually shallow outward. The mantle is represented by a long linear ridge, fading out posteriorly; its length is nearly one and one half that of the siphonal cartilage.

The actual measurements of the siphon in our specimens Nos. 1 and 2 are as follows:—

Mantle length.	No. of Specimens.	
	No. 1.	No. 2.
Length of the siphon along the side.....	38 mm.	37.0 mm.
Length in mid-ventral line.....	23 mm.	22.5 mm.
Length of the siphonal cartilage.	24 mm.	23.0 mm.

The head is rather short, narrower than the mantle orifice; the dorsal surface is slightly convex, the ventral surface is less so, the median line of the latter more or less flattened. The dorso-ventral diameter of the head nearly equals the diameter between the upper margin of the eyes, which is greater than the length. The orifice of the eye not very large, a deep sinus near the base of the lid. The buccal membrane with seven points, seven fastenings and six pores; the inner surface with longitudinal folds.

The actual measurements of the head of the five specimens are as follows:—

No. of Specimens.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Length, dorsal surface.....	29 mm.	24 mm.	25 mm.	25 mm.	30 mm.
Length, ventral surface.....	17 mm.	11 mm.	14 mm.	13 mm.	17 mm.
Breadth between the eyes...	32 mm.	27 mm.	30 mm.	30 mm.	37 mm.
Thickness.....	34 mm.	27 mm.	31 mm.	31 mm.	38 mm.

The posterior margin of the head is produced posteriorly in form of a broad triangular process in the median line, whence laterally it runs more or less in a wavy line till to the anterior end of the third longitudinal fold of the neck, which is situated in a line passing through the middle of the eye lid. The continuation of this marginal line also shows a wavy outline, the anterior ends of the first, the second and the third longitudinal folds of the neck lying at the bottom of the waves, if the head of the animal is placed away from the observer. The entire margin, though very distinct, specially by the difference in colour between the head and the neck, does not show any well defined ridge which fades away near the base of the first longitudinal fold. This fold which is as said before, continuous



with the edge of the siphonal groove, forms an obtuse, more or less rounded angle with it. It is a membranous piece and runs obliquely caudo-dorsalward; its antero-inferior portion is rather high, gradually becoming low and insignificant, and ends near the median portion of the second fold. This fold begins with a slight notch from the posterior margin of the head, in the line passing through the dorsal base of the fourth arm, i.e. a little ventral to the level of the lower eye-lid. It is larger than the first, but runs nearly in the same direction with it; its posterior margin is rounded, but not quite uniform, being interrupted by an olfactory lobe. The third fold begins in the line passing through the middle of the eye-lid, a little above the sinus, where the margin of the head makes an angular projection caudalwards with which the fold joins the same. It is the largest of the three, having a similar shape to that of the second. The line of attachment of the fold on the side of the neck differs, however, a little from that of the second. While, for the ventral half, it runs obliquely dorsalward, its postero-dorsal half runs transversally to the neck, with the dorsal end more or less curved anteriorly. The dorsal end of the third fold lies in a line somewhat ventral to the line between the first and the second arms. The posterior half of the fold then gives the appearance of being a part of the posterior circular fold of the neck. No fold can be seen on the nape.

The arms are subequal in length, the first is the shortest, then comes the third, while the second and the fourth are sometimes of the same and sometimes of different lengths, but are always longer than the third. The actual measurements of the arms of our specimens are as follows:—

No. of Specimens.	No. 1.	No. 2.	No. 3.	No. 4 <sup>2</sup> .	No. 5.
Length of the mantle.....	192mm.	147mm.	183mm.	185mm.	275mm.
Length of the 1st arm...{					
left	125mm.	111 <sup>1</sup> mm.	122mm.	102mm.	145mm.
right	120mm.	95 <sup>1</sup> mm.	125mm.	102mm.	135mm.
Length of the 2nd arm...{					
left	112 <sup>1</sup> mm.	136mm.	143mm.	128mm.	185mm.
right	139mm.	131mm.	120 <sup>1</sup> mm.	125mm.	175mm.

1 Tip of the arm is lost.

2 The arms of the specimen No. 4 are strongly contracted owing to the condition of preservation.

No. of Specimens.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	
Length of the 3rd arm...	left	132mm.	120mm.	107 <sup>1</sup> mm.	120mm.	170mm.
	right	132mm.	113mm.	76 <sup>4</sup> mm.	123mm.	160mm.
Length of the 4th arm...	left	140mm.	131mm.	141mm.	126mm.	196mm.
	right	138mm.	122mm.	143mm.	125mm.	180mm.

The arms are all rather stout, but their distal portion attenuates toward the tip. The first arm shows a low membrane running along the outer margin of the basal portion; it is very distinct at its base where it is continuous with a less developed one on the inner margin of the second arm, and can be traced till about the middle of the length of the arm. A similar membrane is seen on the second arm. It is more developed than that of the first, and can be traced to the tip of the arm, the basal portion of it forming a web between the second and the third arms. The membrane of the third arm is as usual the largest. It begins a little way from the base of the arm slightly ventral (in the body of the animal) to the above stated web which is continuous from the basal portion of the membrane of the second arm, becoming gradually higher till about one-third from the base of the arm, where it is nearly one and a half times as high as the thickness of the arm at the corresponding point. From this point distally it again becomes lower, and can be traced to the extreme tip of the arm. The fourth arm has a well developed membrane on the outer margin along the entire length. At the base it is continuous with the web extending from the outer ventral base of the third arm, and is at its basal portion a little lower than the thickness of the arm. The protecting membranes are similarly developed on all the arms. These are thin membranes nearly equal in height to the entire length of the sucker of the corresponding part and supported by a series of fleshy transverse bands or ridges standing rather obliquely outward from the base of each sucker. These ridges being a little higher than the membrane between them, give a scalloped outline to the margin of the membrane. The suckers on the arms are arranged in two alternating rows. In all the arms the last sucker is the smallest and begins nearly at the same distance from the base; the following suckers become gradually larger, those of the 6th—11th being generally the largest, whence they get again smaller as we

proceed toward the tip of the arm. On the proximal portion the suckers are globular in shape with shorter pedicels, and more widely set, while distally they become more crowded, each sucker somewhat more shallow and with longer and more slender pedicel. The chitinous ring without dentition, the margin standing out like a collar, with very fine denticulation.

The suckers on the arms of one of our specimens (No. 1) are counted as follows:—

	Left	Right
1st arm	46	40
2nd arm	19 <sup>3</sup>	57
3rd arm	51	50
4th arm	56	55

The tentacles are longer than the mantle, their proportional lengths being as follows:—

No. of Specimens.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Left tentacle.....	112 mm.	145 mm.	153 mm.	191 mm.	323 mm.
Right tentacle.....	100 mm.	194 mm.	177 mm.	94 <sup>4</sup> mm.	331 mm.

The basal portion of the stalk of the tentacle is more or less semi-circular, with the flattened dorsal and the rounded ventral surfaces. Distally the inner side of this rounded surface becomes flattened, and the diameter of the tentacle thus becomes more or less triangular, with the inner and the dorsal sides flattened and with the rounded ventral side. Near the carpal portion, the dorsal side also becomes somewhat rounded. A distinct swimming membrane along the outer margin of the stalk extending to near the base of the distal (ventral) hook of the fourth or fifth row on the hand portion of the club. This membrane is not high, but nearly equally developed all along its length. Along the dorso-inner margin of the carpal portion of the club, the inner margin of the dorsal surface becomes raised in form of a distinct ridge, then membranous as it continues to the hand portion, where it ends near the fifth or sixth hook from the base. Another membrane is found on the ventral outer side of

<sup>3</sup> The tip of the arm is torn off.

<sup>4</sup> The right tentacle of this specimen is very much contracted.

the same. This membrane is nearly of the same length as the last, but is more developed, and begins at the ventral inner side of the distal end of the carpal portion, running transversally at first, and then with a broad curve it turns somewhat obliquely toward the ventral outer side, to end at about the seventh hook of the hand whence distally it can be traced along the base of the dorsal hooks to the end of the tentacle as a very low ridge. A similar but more developed membrane is seen along the base of the ventral hooks.

On the dorsal side of the club, midway between the end of the swimming membrane and the above stated membrane along the dorso-inner margin of the distal two-thirds of the club, a third membrane is to be observed. It begins at about the level of the fourth row of hooks and can be traced to the extreme tip of the tentacle, forming the outer edge of the same which is here dorso-ventrally flattened.

The fixing apparatus of the carpal portion consists of a group of pads and suckers, confined in an oval area, and surrounded by a distinct membrane. These, when observed from the ventral proximal one obliquely dorsalwards, are seen to be roughly arranged in six rows, the relative positions of the suckers (S) and pads (P) in the five specimens being arranged as follows :—

The fixing apparatus.	No. of Specimens.				
	No. 1.	No. 2	No. 3.	No. 4	No. 5.
Right.	S. P. S.	P. S.	P. S. P.	S. P.	S. P.
	P. P. P.	S. S. S.	S. S. S. S.	P. P. P.	S. S. S.
	S. S. S. S.	P. P. P.	P. P. P. P.	S. S. S. S.	P. P. P. P.
	P. P. P.	S. S. S.	S. P. S.	P. P. P.	S. S. S.
	S. P. S.	P. S. P.		S. P. S.	P. S. P.
Total number of S & P	8S 8P	8S 7P	7S 7P	7S 8P	8S 7P
Left.	P. S. P.	S. P.	S. P. S.	S. P.	P. S.
	S. S. S.	P. P. P.	P. P. P. P.	S. S. S.	P. P. P.
	P. P. P. P.	S. S. S. S.	S. S. S. S.	P. P. P. P.	S. S. S. S.
	S. S. S.	P. P. P.	P. S. P.	S. S. S.	P. P. P.
	P. S. P.	S. P. S.		P. S. P.	S. P. S.
Total number of S & P	8S 8P	7S 7P	8S 7P.	8S 7P	7S 8P

It will be remarked in this counting, that in the most distal row the median one (pad or sucker) is always situated further distally than the outer two, the three elements here forming a triangle.

The hand portion is armed with thirteen pairs of hooks placed obliquely on the inner surface of the tentacles, the distal half of this portion facing gradually towards the dorsal side. The first hook begins either with a ventral or with a dorsal one, and either directly distal or somewhat further away from the fixing apparatus. The hooks are of variable size; the smaller ones have relatively broader bases than the larger, the recurved portion is also longer relatively than the not curved stalk. The first sucker, when a dorsal one, is the smallest, but when it is a ventral one, it is either a little smaller or nearly equal to that of the second in the dorsal row. Of the following pairs those of the ventral row are always larger than the dorsal. The ventral suckers gradually increase in size from the first to the sixth, the seventh, and the eighth, whence distally they become smaller again. Of the dorsal row the hooks become larger till the fourth, the fifth and the sixth, becoming smaller again distally. The difference between the largest and smallest teeth is much greater in those of the ventral than in those of the dorsal row, and while the teeth of both the rows are nearly of equal size at both the extreme ends of the hand, the largest ventral tooth measures about one-half as long as that of the dorsal. The teeth of the ventral row at both the ends also differ in shape, inasmuch as those near the proximal end have broader bases than those placed near the distal end.

At the extreme end of the tentacle, beyond the hooks, there is an area with a group of ten to thirteen suckers. These suckers are not of equal size, some having about twice the diameter of the others, and are arranged roughly in four or five oblique rows in the dorso-ventral direction.

The pen is strongly chitinous; and has almost no free rhaclis. The ventral surface of the rhaclis is hollowed out in the shape of a semicircle; its median portion is represented by a narrow colorless line, while the two margins are thickened and deeply colored. These margins first diverge very slowly till about one-half from the anterior end of the entire length of the pen, whence they converge gradually to the tubular cone. The



marginal area begins close to the anterior end of the pen, and spreads out horizontally on both sides of the rhachis for the anterior thirds, then it begins to curve downward, the curvature gradually increasing posteriorly. The breadth of the marginal area gradually increases till about the middle of the pen. Posteriorly it decreases gradually till it reaches the cone. As, however, the marginal area curves ventralward the broadest portion of the pen appears to lie at about the middle of its length, when it is viewed either from the dorsal or from the ventral side. The anterior end of the marginal area is nearly uniformly colored, posteriorly it shows a number of deep brown-colored striations running outward and downward. Along the margins of the posterior half of the pen, these striations become, so to speak, collected together and form a strong rod-like rib on each side. The two ribs approach each other and unite to form the posterior lip of the spoon. The posterior end of the rhachis begins to bend toward the ventral side at the dorsal end of the cone, where it unites the above mentioned lateral ribs of the marginal area. The terminal cone is not cylindrical, but is triangular with a narrower dorsal, and broader lateral surfaces. The dorsal surface, which forms the base of the triangle, is not of an equal breadth, but is narrowed both anteriorly and posteriorly. At the anterior end, which is narrower than the posterior, it is continuous with the median posterior end of the rhachis which here becomes broader, the lateral chitinous portions of which becoming, as stated above, united with the margins of the marginal area. The broadest part of the base of the triangle lies at about one-third from the anterior end. The sides of the triangle have also a triangular shape with a long base which is represented by the margin of the dorsal side and with two unequal sides, the one along the posterior limb of the marginal area, and the other represented by the ventral line. This ventral line as well as the dorsal flattened surface of the cone is curved dorsalwards, so that the side view of the cone looks like a slightly bent horn of cattle. The side of the cone is marked with fine striations diverging from the posterior ventral mid-lip of the spoon.

The color of the animal is purple-brown with a yellowish pearly luster; the ventral side lighter.

Of the five animals, we obtained, one was found by C. Ishikawa on the

beach at Hayama, Sagami Bay, most probably thrown away by fishermen, as the animal is not palatable. The four others were caught by fishermen off Misaki Station, also Sagami Bay, at a depth of from four to five hundred fathoms.

The peculiar plastered structure of the dermis, the relative length and the shape of the siphonal and the mantle cartilages, the three longitudinal neck folds; the ventral position of the sinus of the eye-lid; the buccal membrane with seven points and fastenings; six water pores; the presence of a membrane surrounding the fixing apparatus of the carpal portion of the tentacular club; arms with only two rhachial rows of hooks; and the structure of the gladius; all these characters combined show without doubt, that the above described animal belongs to the genus *Moroteuthis*. The only point which apparently does not coincide with this genus is the absence of the furrow on the anterior portion along the middorsal line of the mantle. This is apparently visible in one of the five specimens, but is lacking in four, so that we can safely state that this furrow does not exist in our forms. If we can verify this point on all other specimens of the species, we have to look upon its presence or absence only as specific characters.

As well known, only two species are till now known of the genus *Moroteuthis*, *M. robusta* (DALL) VERRILL, and *M. ingens*. (E. A. SMITH). From *robusta* it differs in the following points: 1) The elevations of the dermis which in *robusta* run more or less obliquely and transversally to the body of the animal, run in our species longitudinally. 2) The posterior end of the fins are produced more strongly in *robusta* than in our species.<sup>5</sup> It will be remarked here that the shape of the fin of our specimens stands between those of *robusta* and *ingens*. 3) The neck-folds are directed obliquely backward in *robusta*, whereas in our species the anterior portions are placed longitudinally. 4) The number of suckers on the fixing apparatus is fewer in our species than in *robusta*, there being 10-11 in the latter and

<sup>5</sup> THOMPSON describes the fins in his specimen as follows: "The broadest part of the fins is about twenty-seven inches from the apex, which they reach, and towards which their trapezoidal outline is sharply narrowed." I. c. p. 992. This corresponds well with what we observed in our specimen of *robusta* (see our paper in this number of the Journal). The different shape of the fins sketched by DALL and given by VERRILL in his Plate is apparently to be ascribed to the erroneous observation of DALL, rather than to true differences existing between them.

7 or 8 in the former. 5) The number of hooks in the hand portion of the tentacle in *robusta* amounts to 18 pairs, whereas in our species only 13 pairs are found. To these we can perhaps mention the gigantic size of *robusta* compared with the present species.

The following points can be enumerated as differences between the present species and *ingens*: 1) The shape of the mantle of our species is rather slender, and is more or less evenly conical, and greatly produced posteriorly; the length of the mantle to its greatest breadth being about 4:1. In *ingens* the mantle is relatively shorter, its length to breadth being about 3:1, and bulges out at near its posterior third, whence it narrows rather abruptly. 2) In *ingens* the elevations of the dermis on the mantle are angular or spherical, the interspaces between them forming a network, whereas in our species, as stated above, these are arranged more or less in longitudinal directions. 3) The posterior end of the inner margin of the ear-lobe at the anterior attachment of the fin is directed outward in *ingens* and inward in our species. 4) The length and the breadth of the fins in percentage to the length of the mantle differs in two species. These are 49-58% and 61-71% in *ingens* and 52-55% and 48-55% in our species. 5) The inner surface of the buccal membrane is beset with large villi in *ingens*, and with longitudinal foldings in our species. 6) The relative length of the arms, of which the third is longer than the second and the fourth in *ingens*, while in our species it is shorter. 7) The number of suckers in the fixing apparatus is 8-13 in *ingens*, and 8 or 7 in our species. 8) The number of suckers on the terminal area of the tentacle is stated to be 13-18 in *ingens*, whereas in our species it is 10-14. And lastly, there are 13-16 pairs of hooks on the hand portion in *ingens*, and 13 pairs in all our five specimens.

These differences may be enumerated as follows:—

	<i>M. ingens.</i>	<i>M. robusta.</i>	<i>Our species.</i>
The shape of the mantle:—	Club-shaped, bulging out at the posterior third.	Evenly conical.	Retort-shaped, bulging out at about the anterior third; narrowed poster- iorly.

	<i>M. ingens.</i>	<i>M. robusta.</i>	<i>Our species.</i>
The length of the mantle to its breadth:—	3 : 1. <sup>6</sup>	5 : 1.	4 : 1.
The structure of the mantle:	Plaster-like elevations on the mantle, spherical or transversally elongated. <sup>7</sup>	Plaster-like elevations on the mantle, directed more or less obliquely or transversally.	The elevations on the mantle, directed more or less longitudinally; those on the head shagreen-like.
The shape of the fins:—	Rhomboidal; the antero-lateral margins nearly equal to or a little shorter than the postero-lateral, the lateral angles lie therefore nearly in a line passing through the middle of the length of the fins.	Rhomboidal, with the posterior end strongly elongated; antero-lateral margins nearly 1/2 as long as the postero-lateral; the lateral angles lie further on the anterior half of the fins. <sup>8</sup>	Rhomboidal, with the posterior end elongated, the antero-lateral margins about 2/3 of the postero-lateral; the lateral angles lie at about 1/3 of the anterior end of the length of the fins.
The ear-lobe of the fin:—	The posterior end of the inner margin of the ear-lobe is directed outward.	?	The posterior end of the inner margin of the ear-lobe is directed toward the median line of the body.
The length of the fin in % to that of the mantle.	49-58% <sup>6</sup>	56% <sup>8</sup>	52-55% <sup>0</sup>

6) Roughly estimated from the figure given by PEEFFER (Taf. XI).

7) LÖNNBERG describes the plaster-like structure of *ingens* as like the pavement of an old style street. Looking at his figure (Pl. IV) there is an area on the right hand side of the mantle where the elevations are elongated and run transverse to the animal.

8) This is described from a single specimen we observed.

	<i>M. ingens.</i>	<i>M. robusta.</i>	<i>Our species.</i>
The breadth of the fin in % to that of the mantle.	61-71 %	43% <sup>9)</sup>	48-55%
The longitudinal neck-folds:—	The anterior portions directed longitudinally to the neck, the posterior portions somewhat obliquely.	All neck-folds directed obliquely backward. <sup>10)</sup>	The anterior parts directed more or less obliquely backward; the posterior portions transversally.
The inner surface of the buccal membrane:—	With large villi.	?	With longitudinal foldings.
The relative length of arms:—	2. 3. 4. nearly of equal length, of which 3. somewhat longer, and 1. is the shortest.	2. 3. nearly of equal length; 4. is the longest, and 1. is the shortest.	2. 4. nearly of equal length, 3. is shorter than 2. and 4.; 1. is the shortest.
The number of suckers on the fixing apparatus:—	8-13	10-11 <sup>11)</sup>	8 or 7 <sup>13)</sup>
The terminal group of suckers of the tentacle:—	13-18	?	10-14
The number of hooks on the hand portion.	Dorsal 13-16 Ventral 13-15	18 pairs <sup>12)</sup>	13 pairs.

9) Estimated from the length given by THOMPSON.

10) VERRILL describes them as "three wavy, raised bands or frills, attached at their inner edge passing obliquely backward, on each side" of the neck.

11) In THOMPSON'S specimen 11, and in our specimen 10.

12) THOMPSON states in his description that there are "about eighteen pairs" of hooks.

13) When there are seven suckers, there are eight pads, and vice versa.



These are enough points, we think, to consider the present form of *Moroteuthis* as a new species, which we have the honor of dedicating to Professor EINAR LÖNNBERG of Stockholm, not only for his kindness in helping the authors by sending them the necessary literature on the subject, but also for his valuable investigations on the plaster-like structure of the dermis in this genus.

For the three species of *Moroteuthis* we venture to give a short diagnosis in the following lines:—

Mantle evenly conical, posterior end sharply produced; the breadth across the lateral angles of the fins shorter than the length of the same, and nearly equals the distance between the line of the breadth and the apex of the fins along the median line. This line joining the lateral angles lies at about the anterior fourth of the length of the fins. Hooks on the hand portion of the tentacle in eighteen pairs; fixing apparatus with ten to eleven suckers.

*M. robusta* DALL VERILL,

Mantle bulges out at about its anterior third, posterior end sharply produced; the breadth across the lateral angles of the fins nearly equals their length, and lies at about the anterior third. Hooks on the hand portion of the tentacle in thirteen pairs; fixing apparatus with seven or eight suckers.

*M. lönnbergii* ISHIKAWA et WAKIYA.

Mantle bulges out near its posterior third, posterior end not much produced; the breadth across the lateral angles of the fins greater than their length, and lies slightly posterior to the middle of the length. Hooks on the hand portion of the tentacle in thirteen to sixteen pairs; fixing apparatus with eight to thirteen suckers.

*M. ingens* (E. A. SMITH.).

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### EXPLANATION OF PLATES.

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#### PLATE XLV.

*Moroteuthis lönnbergii* ISHIKAWA et WAKIYA.

Fig. 1. Female animal, specimen No. 5, ventral view. 1/2 nat. size.

## PLATE XLVI.

*Moroteuthis lönnbergii* ISHIKAWA et WAKIYA.

Fig. 2. Tentacular clubs, specimen No. 4. Fig. 2a, left, oral view; Fig. 2b, right, aboral view. Twice nat. size.

Fig. 3. Head, specimen No. 5, dorsal view, showing the dermal structure. Nat. size.

Fig. 4. Siphon laid open, showing the siphonal organs and the valve. Nat. size.

Fig. 5. Left mantle cartilage. Nat. size.

Fig. 6. Head, ventral view, showing the siphonal groove; the siphon is pushed a little to one side. Nat. size.

Fig. 7. Oral cone with basal portions of the arms, specimen No. 5.  $\frac{2}{3}$  nat. size.

Fig. 8. Head, side view, showing the longitudinal foldings on the neck, specimen No. 4. Nat. size.

Fig.1.

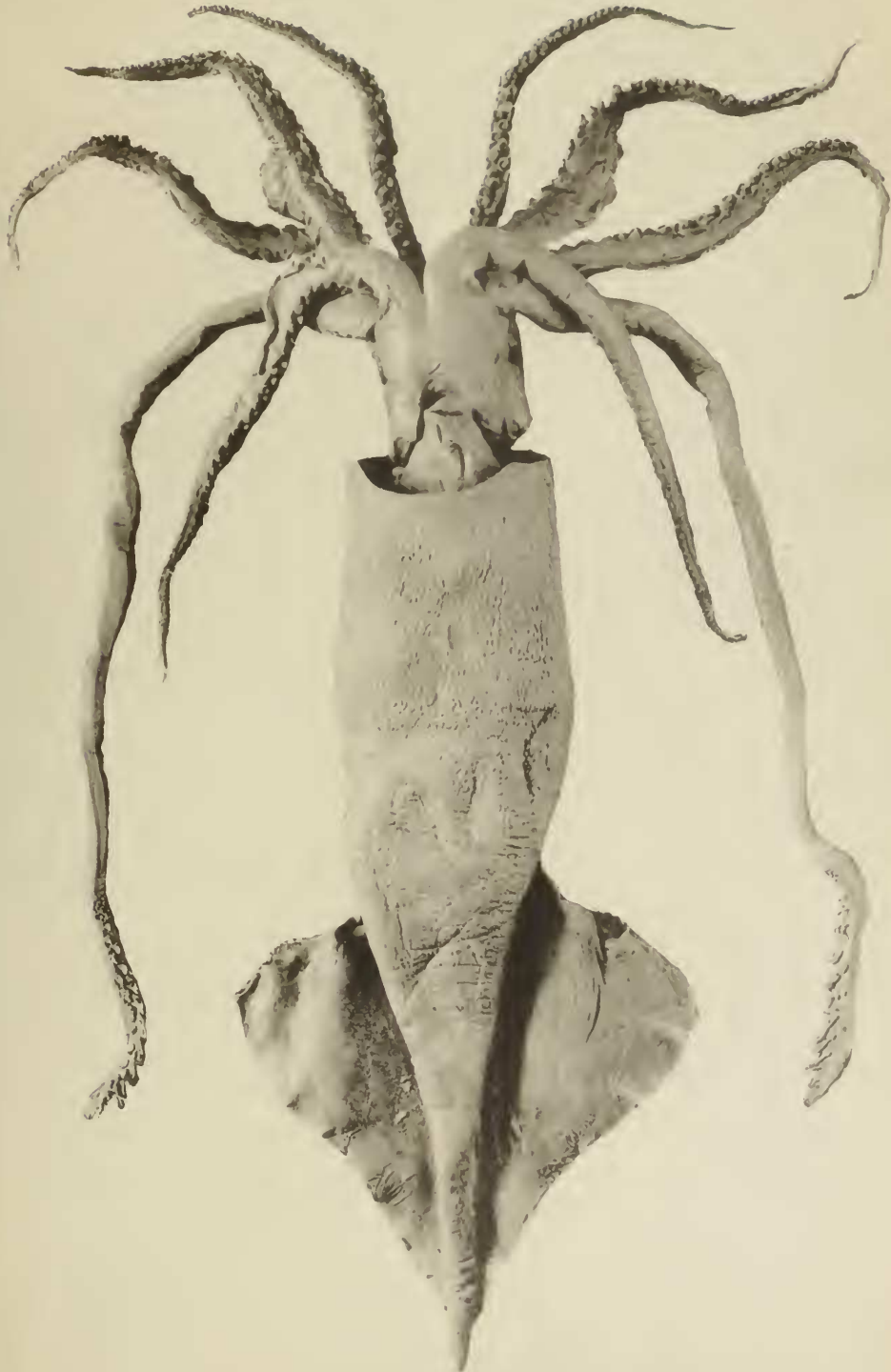


Fig. 2a.



Fig. 4.

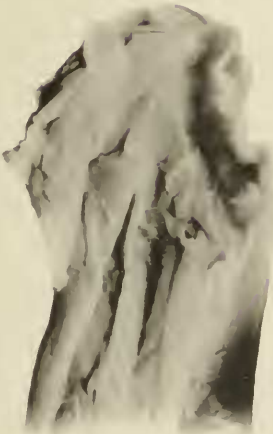


Fig. 3.



Fig. 2b.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.

